

DESCRIPTIONS OF NEW ISOPOD CRUSTACEANS OF THE
FAMILY SPHEROMIDÆ.

By HARRIET RICHARDSON,
Collaborator, Division of Marine Invertebrates.

In order to give fuller diagnoses of some genera recently established in my monograph on the Isopods of North America and to illustrate some of the parts which were taken as a basis of generic distinctions I have prepared the following paper, in which I also offer descriptions of a few new species and one new genus. Five of the species are from South America, two are from Japan, one comes from Cape Town, Africa, and the locality of another is unknown. All, with the exception of *Isocladus magellanensis*, are in the collection of the United States National Museum.

Genus TECTICEPS Richardson.

Body oval and somewhat flattened. Head subquadrangular, broader anteriorly than posteriorly with the anterior and lateral margins produced, concealing the antennæ.

The antennæ, which are entirely hidden, extend backward and lie under the epimeral plates at the sides of the thorax. The first and second pairs of legs in the male are subchelate; the first pair terminate in a large hand and finger, bearing a small hook; the second pair terminate in a more irregularly shaped hand. All the other legs are simple in structure. In the female only the first pair of legs are subchelate.

The terminal segment of the abdomen is triangular and entire, and is pointed at the extremity. The uropoda are double-branched and lateral, and resemble closely those of the genus *Spheroma*. Both branches are well developed and similar in shape.

This genus differs from the genus *Ancinus* of Milne Edwards—

1. In having uropoda with two branches instead of one.
2. In having the abdomen entire and not truncate at the tip.
3. In the prominent projection of the anterior and lateral margins of the head.
4. In the concealment of the antennæ, which are very conspicuous in *Ancinus*.

The type species of the genus is *Tecticeps alascensis* Richardson.

TECTICEPS ALASCENSIS Richardson.

Tecticeps alascensis RICHARDSON, Proc. Biol. Soc. Washington, XI, 1897, pp. 181-183, figs. 9-12; Proc. U. S. Nat. Mus., XXI, 1899, p. 837; Ann. Mag. Nat. Hist. (7), IV, 1899, p. 181; Bull. U. S. Nat. Mus., No. 54, 1905, pp. 276-278, figs. 286-289.

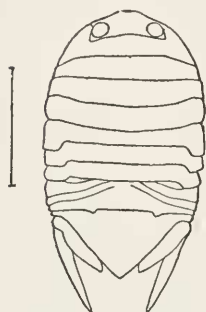
Localities.—North of Amak Island; off Cape Menchikoff; south of Hagemeister Island; North Head, Akutan Island; off Bristol Bay; Alutian Islands, off Unimak Island; Kamchatka; off Sturup Island, Kurile Islands, Okhotsk Sea; latitude $60^{\circ} 16'$ north, longitude $167^{\circ} 41'$ west; Bering Sea, west of Pribiloff Islands, between Pinnacle and Ulakhla, Unalaska; Bering Sea, off Nunivak Island.

Depth.—9-106 fathoms.

U. S. National Museum collection.

The outline of the body is oval. The surface is quite smooth, but covered with little points of depression. Length 16 mm.; width 10 mm.

FIG. 1.—TECTICEPS ALASCENSIS. MALE, $\times 24$.



The head is large, twice as long as any one of the thoracic segments. The anterior margin is produced in a way to conceal the antennae, as are also the antero-lateral margins, making the anterior portion of the head in front of the eyes much broader than the posterior portion, and forming very acute antero-lateral angles. This frontal margin forms a very broad obtuse angle with its apex in the median line. On either side of this apex to the antero-lateral angle this portion of the head is somewhat depressed. The antennae are not conspicuous, lying concealed beneath the frontal margin of the head. The first pair extend to the posterior angle of the first thoracic segment; the flagellum is composed of ten articles. The second pair reach the middle of the second segment; the flagellum consists of twelve articles. The eyes are dorsally situated on the posterior half of the head in both sexes.

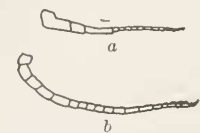


FIG. 3.—TECTICEPS ALASCENSIS. a, ANTENNA OF FIRST PAIR. b, ANTENNA OF SECOND PAIR. $\times 53$.

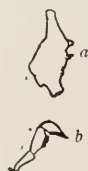


FIG. 2.—TECTICEPS ALASCENSIS. a, MANDIBLE. b, MANDIBULAR APPENDAGE. $\times 53$.

The thoracic segments are about equal in length. The first one extends laterally around the posterior portion of the head, forming a broad plate at the side of the segment. The epimera of all the segments are about twice as broad as long, with the exception of those of the fifth segment, which are nearly square and very conspicuous.

The first segment of the abdomen has three suture lines, and its posterior margin projects down at the sides over the terminal segment. The terminal segment is triangular and has

a very pointed extremity, more acute in the male than in the female. The uropods differ considerably. The inner one is broad and tapering and does not reach the tip of the abdomen. The outer one is slender and sharply pointed, and extends beyond the abdomen. In the female the outer branch is not longer than the inner branch.

The first pair of legs are subchelate, as are also the second pair in the male. In the first pair the propodus is large and oval in shape,



FIG. 5.—TECTICEPS ALASCENSIS. a, LEG OF FIRST PAIR OF MALE. $\times 53$. b, LAST TWO JOINTS OF SAME. $\times 103$. c, LEG OF SECOND PAIR OF MALE. $\times 53$. d, LEG OF THIRD PAIR. $\times 53$. e, LEG OF SIXTH PAIR. $\times 53$. f, LEG OF SEVENTH PAIR. $\times 53$.

and bears in the palma a

row of stiff bristles at regular intervals and pointing obliquely in the same direction, while a thick row of fine cilia, pointing obliquely in the opposite direction, cross these almost at right angles. The dactylus terminates in a single hook, at the base of which two smaller hooks are situated. In the legs of the second pair the propodus is irregular in shape with an indication of a rudimentary pollex. There are no hairs or bristles in the palma. The legs of the third, fourth, and fifth pairs present nothing unusual in structure, but resemble the ambulatory legs common to this family. In the sixth and seventh pairs the structure is the same as that of the preceding legs of the third, fourth, and fifth pairs, but with an increasing disproportion in the length of the propodus and dactylus. In the seventh pair of legs these joints, but more especially the propodus, attain a size most conspicuous for their length. The propodus becomes over $3\frac{1}{2}$ times longer than the carpus which immediately precedes it.

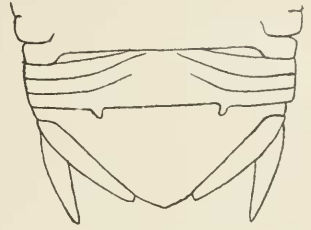


FIG. 4.—TECTICEPS ALASCENSIS. ABDOMEN OF FEMALE. $\times 43$.

The color varies from dark brown to yellow, more or less dotted with black. In the darker specimens the epimera and the uropods are almost white with scattered spots of black. Other specimens are brown, with markings of red and some are bluish-gray in color tinged with brown or orange.

TECTICEPS CONVEXUS Richardson.

Tecticeps convexus RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, pp. 837-838, fig. 15; Ann. Mag. Nat. Hist. (7), IV, 1899, pp. 181-183; American Naturalist, XXXIV, 1900, p. 223; Bull. U. S. Nat. Mus., No. 54, 1905, pp. 278-280, figs. 290-291.

Locality.—Monterey Bay, California.

Depth.—30 feet, in sandy mud.

U. S. National Museum collection.

The body is oval and somewhat flattened. The surface is smooth. The color is light yellow, with markings of brown.

The head has the anterior margin much broader than the posterior margin, and produced in front, but not wholly concealing the basal articles of the first pair of antennae, and somewhat raised, forming two small convex elevations. The antero-lateral margin is likewise produced, forming an acute angular projection, which extends in a lateral direction beyond the post-lateral margin of the head.

The eyes are dorsally situated in a median transverse line in both sexes. The first pair of antennae, with a flagellum of 16 articles, extend to the posterior angle of the third thoracic segment. The second pair of antennae, with a flagellum of 13 articles, extend to the middle of the fourth thoracic segment and exceed by one article the length of the first pair of antennae. Both pairs of antennae are disposed to lie concealed under the broad epimeral plates of the thoracic segments.

The thoracic segments are subequal in length. The first segment has its antero-lateral angles produced around the anterior portion of the head, forming a broad plate at the side of the segment. The epimera are almost twice as broad as long; those of the fifth segment extend downward, with the anterior margin straight, making the length and breadth about equal and forming almost square epimera; in the epimera of the sixth and seventh segments the anterior margins are in the same direction as the posterior margins, which extend downward.

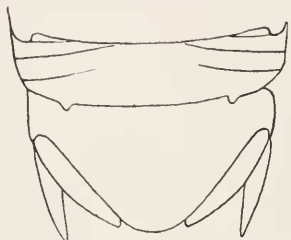


FIG. 6.—TECTICEPS CONVEXUS. ABDOMEN OF FEMALE. $\times 4\frac{1}{2}$.

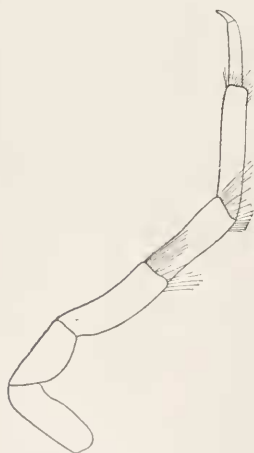


FIG. 8.—TECTICEPS CONVEXUS. SEVENTH LEG OF MALE. $\times 4\frac{1}{2}$.

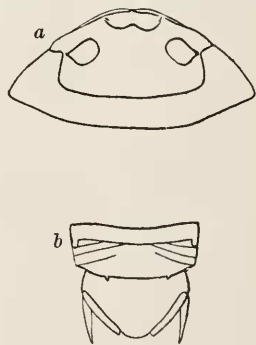


FIG. 7.—TECTICEPS CONVEXUS. a, HEAD. $\times 5\frac{1}{2}$. b, ABDOMEN AND LAST THORACIC SEGMENT. $\times 2\frac{1}{2}$.

The first segment of the abdomen has three suture lines, and its posterior margin is produced in two small points, one on either side of the median line, about equidistant from it and the lateral margin of the segment. The terminal segment is widely rounded posteriorly. The inner branch of the uropoda is of nearly equal width throughout its length and is rounded at its extremity; the outer branch is slender and sharply pointed. Both branches are of nearly equal length, and neither extend beyond the tip of the abdomen. This is true of both sexes.

The first pair of legs have the propodus dilated and the dactylus reflexible. The propodus is large and oval in shape. In the legs of the second pair the propodus is irregular in shape, dilated with reflexible dactylus in the male and simple in the female. The legs of the other five pairs are similar in structure, ambulatory, and show a gradual increase in length.

This species differs from *T. alascensis* in having longer antennæ and antennulæ; in having a rounded terminal segment, which in that species is very pointed but more acute in the male than in the female; in having the outer branch of the uropods in both sexes as short as the inner, while in that species it is much longer in the male but not in the female; in having only a gradual increase in the length of the legs, which in that species show such marked disproportions in the propodus of the sixth and seventh pairs; and in the position of the eyes, which in this species are situated in the median transverse line of the head, while in *T. alascensis* they are placed in the posterior half of the head.

This species was considered by Hansen, who had not examined any specimens, to be a synonym of *T. alascensis*.^a Having sent specimens, a male and female of both species, to Doctor Hansen, I received a courteous and speedy recognition of his error. Doctor Hansen states in his letter that "both species are well founded," and that "*T. convexus* is a fine species; especially the differences in the shape of the first and second hand and seventh thoracic leg in the males of both species are really interesting."

Genus CYMODOCE Leach.

Seventh segment of thorax not produced backward in any process.

Abdomen composed of two segments, the first of which is without mesial process. Terminal abdominal segment in both sexes with a

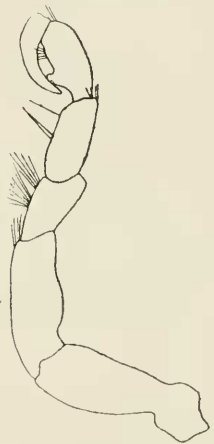


FIG. 9.—TECTICEPS CONVEXUS. SECOND LEG OF MALE. $\times 4\frac{1}{2}$.

^aQuarterly Journal of Microscopical Science, XLIX, Pt. 1, October, 1905, pp. 133-134.

notch in center of which is a median process or lobe. Endopod of uropod well developed. Exopod not capable of folding under endopod.

Exopod of third pleopod always two-jointed.

Fourth and fifth pleopods with endopods thick, fleshy, with transverse folds; exopods two-jointed.

Maxillipeds with the second, third, and fourth articles of the palp produced into lobes.

Mouth parts in female metamorphosed.

The type of the genus is *Cymodoce truncata* Leach.

CYMODOCE ORNATA, new species.

Head large, nearly twice as broad as long, $3\frac{1}{2}$ mm.: 8 mm., rounded anteriorly, with a small median point separating the antennæ. Eyes round, post-laterally situated. The first pair of antennæ extend to the posterior angle of the first thoracic segment; the flagellum is composed of ten to eleven articles. The second pair of antennæ reach fully to the posterior margin of the fourth thoracic segment; the flagellum consists of from eighteen to nineteen articles.



FIG. 10.—CYMODOCE
ORNATA. ABDOMEN OF FEMALE. $\times 6\frac{1}{2}$.

The segments of the thorax are subequal in length, the first being somewhat longer. The epimera are posteriorly produced into very acute angles, gradually becoming less acute, the last one being quite rounded.

The first segment of the abdomen is composed of four coalesced segments, indicated by three suture lines, the third of which forms a ridge in the center.

The sides of this segment are produced into rounded lobes, provided with fine hairs, and overlap the terminal segment. Two small tubercles on either side of the median line are situated on the posterior margin. The terminal segment is thickly tuberculated. At the base are four tubercles, situated in a transverse row. Below these are four others, similarly situated, but farther apart, and differing in size, the two center ones being more prominent. Below this row, and placed in the median line, is a small triangularly shaped prominence, in the center of which is a tubercle. The posterior margin of this segment has a quadrangular excavation, in which there is a central tooth which does not extend beyond the lateral teeth formed by the excavation. The entire margin is fringed with thick hairs.

The uropods, which are about equal in length, extend considerably beyond the extremity of the abdomen. The inner branch is rounded on the inner post-lateral angle and ends in a spinelike process at the outer post-lateral angle; the external one is lanceolate, with upper inner surface very concave; the outer margins of both are fringed with hairs.

The color of the body is brown, more or less marked with black spots. The lower half of each segment of the thorax and the tubercles of the abdomen are a dull yellow.

This species is closely allied to *C. longistylis* Miers,^a but differs in the absence of tubercles on the thoracic segments, and in the disposition of those on the terminal abdominal segment.

Locality unknown. The type and only specimen, a male, is in the U. S. National Museum, Cat. No. 32242.

CYMODOCE JAPONICA, new species.

Body $7\frac{1}{2}$ mm. wide; $17\frac{1}{2}$ mm. long.

Head large, longer than the second thoracic segment, its anterior margin ridged and sinuated and produced in a large median point. The basal joint of the peduncle of the first pair of antennæ is large and elongated; the second joint is small and short; the third joint is long and slender. The flagellum is composed of nineteen articles and extends to the posterior angle of the first thoracic segment. The flagellum of the second pair of antennæ is composed of twenty-four articles and reaches the posterior angle of the third thoracic segment.

The thoracic segments are about equal in length. The epimera are broader than long and are produced into acute angles, becoming more rounded and obtuse in the three posterior ones.

The first segment of the abdomen has two suture lines on either side indicating coalesced segments, and a transverse line indicating still another coalesced segment. Its posterior margin bears two tubercles, pointing downward and on either side of these a small tooth overlapping the terminal segment. The last segment is posteriorly excavated, with a large and broad median tooth within the excavation. This median tooth has a truncate extremity, while the lateral teeth, formed by the sinus, are more acute and rounded. Two small tubercles are situated at the base of this segment in the line with those of the first segment. Following these, and in the same line, are two very large tubercles. A longitudinal furrow or groove in the median line is formed by these two sets of tubercles. The inner branch of the uropoda is truncate at the extremity, is of equal breadth throughout its length, and does not extend beyond the extremity of the abdomen. The outer branch is rounded on the inner side, but has a straight thickened outer edge, terminating acutely; it is about as long as the inner branch.

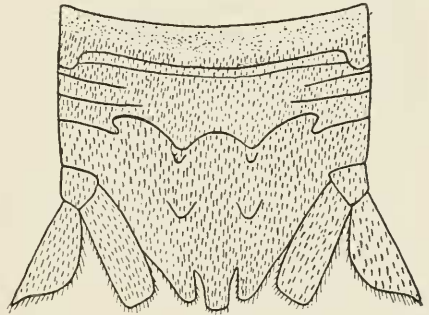


FIG. 11.—CYMODOCE JAPONICA. ABDOMEN AND LAST THORACIC SEGMENT OF MALE. $\times 4\frac{1}{2}$.

^aZool. Coll. of Alert, 1884, p. 305.

The whole surface of the body is granulated and covered with minute hairs, which increase in number and length on the abdomen and the edges of the uropods, where they form a thick fringe. The color light brown.

This species can not be identified with *Cymodoce pilosa* Edwards^a from the Mediterranean, and from the "east and west coast of Algeria," for it differs in a number of points. The surface of the entire body is granulated, while in Milne Edwards species only the posterior half is covered with granules. There is no elevation at the extremity of the longitudinal groove, as in *C. pilosa*, as described by Edwards and figured by Lucas.^b Moreover, two tubercles are found on either side of the groove in the present species, while in *C. pilosa* there is but one mentioned and figured. Lastly, the uropods do not extend a great deal beyond the extremity of the abdomen, as in *C. pilosa*, but reach the extremity only. It differs also from *Cymodoce aculeata* Haswell in the different arrangement of the tubercles on the terminal abdominal segment. The species is founded on three specimens, all males, from Hakodate Bay, Japan, which are in the collection of the U. S. National Museum.

Types.—Cat. No. 32243, U.S.N.M.

CYMODOCE AUSTRALIS, new species.

Body ovate, 3 mm. : 6 mm.

Head wider than long, with the front marginate and produced in a small, median point. The eyes are large, composite, and situated in the post-lateral angles. The first pair of antennæ have the first article oblong, longer than wide, and produced at the outer distal angle in a small truncate process; the second article is small, oval in shape, about one-third as long as the first; the third article is narrow, elongate, about one and a half times as long as the second. The flagellum is composed of about fifteen joints. The first antennæ extend to the posterior angle of the first thoracic segment. The second pair of antennæ, with a flagellum of about seventeen articles, extend to the posterior margin of the third thoracic segment.

The first segment of the thorax is longer than any of those following and has the post-lateral angles produced backward. All the following segments are crossed transversely by a carinated ridge. The epimera are not distinctly separated, but faint lines of depression indicate the place of coalescence. The lateral parts of the segments have the posterior angles produced in narrow pointed processes directed posteriorly.

The abdomen is composed of two segments and is broader than the thorax, although dorsally it does not show any increase in breadth.

^a Hist. Nat. des Crust., III, 1843, p. 213.

^b Explorations Scientifiques de l'Algérie, Atlas, 1849, pl. VII, fig. 8.

The first segment has suture lines indicating other partly coalesced segments. On the posterior margin are two prominent tubercles, one on either side of the median line, directed backward as two points. The second or terminal segment terminates in three teeth, the median tooth completely filling the notch, of which the other teeth form the outer angles. The median tooth is not longer than the lateral teeth and is acute at the apex. At the base of the segment are two small tubercles in a transverse series just below the large tubercles of the preceding segment and situated a little outside of them. There are two other small tubercles just below this series in another transverse row and situated a little within the two upper tubercles. A transverse row of four large tubercles is placed below this second series. Just above the median tooth of the posterior margin and below the last series of four tubercles is a small median tubercle.

The inner immovable branch of the uropods reaches but little beyond the lateral teeth of the posterior margin of the terminal abdominal segment. It is posteriorly transversely truncate and has the sides parallel. The outer branch is nearly twice as long as the inner branch, is pointed at the extremity, and is leaf-shaped.

The entire surface of the abdomen is thickly tuberculate. The posterior margin of the terminal segment and the branches of the uropods are beset with hairs.

The specimen described is a male and is the type and only specimen. It was taken by the U. S. Bureau of Fisheries steamer *Albatross* off Cape St. Roque, Brazil, at a depth of 20 fathoms, among broken shells, and is preserved in the U. S. National Museum, Cat. No. 32244.

CYMODOCE MERIDIONALIS, new species.

Body with the sides almost parallel, $4\frac{1}{2}$ mm.: 10 mm.

Head wider than long, and produced in a small median point. Eyes large, composite, and situated in the post-lateral angles. The first pair of antennæ have the first article oblong, nearly twice as long as wide; the second article is small, oval, and less than half the length of the first; the third article is as long as the second, but narrower, and is twice as long as wide. The flagellum is composed of seventeen articles, and extends to the post-lateral angle of the first thoracic segment. The second pair of antennæ, with a flagellum of twenty-two articles, extends to the post-lateral angle of the third thoracic segment.

The first segment of the thorax is longer than any of the others. The epimera are not distinct from the segments. They are laterally produced in narrow processes. The first segment has the post-lateral angles also produced.

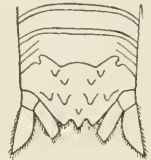


FIG. 12.—CYMODOCE AUSTRALIS. ABDOMEN AND LAST THORACIC SEGMENT OF MALE. $\times 6\frac{1}{2}$.

The first segment of the abdomen has two suture lines on either side, indicating other coalesced segments. The terminal segment has a very deep median notch, the lateral angles being rather acute. Within the emargination, and completely filling it, is a large triangular median tooth, broad at the base and ending in a very sharp spine. This median

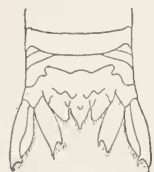


FIG. 13.—CYMODOCE
MERIDIONALIS.
ABDOMEN AND
LAST THORACIC
SEGMENT OF MALE.
× 4½.

tooth extends considerably beyond the lateral angles. At the base of the segment is a series of four tubercles situated in a transverse line. Below this row and outside of it are two prominent tubercles, one on either side. Below this transverse row of two tubercles is another row of two tubercles, one on either side of the median line, and situated closer together than the two preceding tubercles. At the base of the median tooth within the terminal notch is a small median tubercle. Both branches of the uropoda extend beyond the abdomen. The inner branch is twice as long

as wide, with sides nearly parallel and posteriorly obliquely truncate, with a spine at the outer and inner post-lateral angles. The outer branch is leafed-shaped and longer than the inner branch, and terminates in a spine. There is also another spine on the outer margin near the extremity.

The type and only specimen, a male, comes from off Cape St. Roque, Brazil. It was taken by the U. S. Bureau of Fisheries steamer *Albatross* at a depth of 20 fathoms, among broken shells, and is in the U. S. National Museum, Cat. No. 32245.

CYMODOCE BRASILIENSIS, new species.

Body ovate, more or less contractile, 4 mm.: 8 mm.

Head wider than long, with the front produced in a small median point. Eyes small, composite, and situated in the post-lateral angles. The first pair of antennæ have the first article oblong, about twice as long as wide; the second article is short and small and is one-third as long as the first article; the third article is narrow and elongate and about twice as long as the second article. The flagellum is composed of fifteen articles, and extends to the post-lateral angle of the first thoracic segment. The second pair of antennæ, with a flagellum of eighteen articles, extends to the posterior margin of the fourth thoracic segment.

The first segment of the thorax is longer than any of those following. The epimera are not distinctly separated on any of the segments. The post-lateral angles of the first segments are produced backward. The lateral parts of the following segments are posteriorly produced in narrow processes.

The abdomen is wider than the thorax, but this increase in width is not apparent in a dorsal view. The first segment has suture lines indicating other partly coalesced segments. It is produced at either

side in a small point, overlapping the terminal segment. The terminal abdominal segment has two large elevations or prominences on the convex basal part, one on either of the median line, the two being separated by a furrow. The terminal part of the segment has a median notch, which is completely filled by a large, triangular lobe, rounded at the apex and slightly exceeding in length the lateral angles, which are truncate posteriorly. The uropods do not extend beyond the lateral angles of the terminal segment of the abdomen. The branches are about equal in length, the outer, movable branch being capable of folding under the inner branch. The inner branch is truncate at the extremity, with a slight excavation about the center. The inner post-lateral angle of the outer branch is rounded, the outer post-lateral angle being acute.

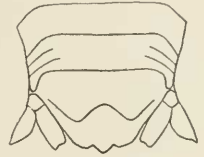


FIG. 14.—CYMODOCE BRASILIENSIS. ABDOMEN AND LAST THORACIC SEGMENT OF FEMALE. $\times 6\frac{1}{2}$.

The specimen described is a female. Four perfect specimens and one imperfect specimen come from off Cape St. Roque, Brazil. They were collected by the U. S. Bureau of Fisheries steamer *Albatross*, at a depth of 20 fathoms, among broken shells.

The types are in the U. S. National Museum, Cat. No. 32246.

CYMODOCE AFFINIS, new species.

Body ovate, a little more than twice as long as wide, 8 mm.: $17\frac{1}{2}$ mm. Head transverse, twice as wide as long, $3\frac{1}{2}$ mm.: 7 mm., with the front marginate and produced in a small median point. The eyes are large, composite, and posteriorly situated. The first pair of antennæ have the first article elongate, about twice as long as wide; the second article is small and less than half the length of the first; the third is narrow, about one-fourth the width of the first article, and elongate, being about two and a half times as long as wide. The flagellum is composed of about sixteen articles and does not extend to the post-lateral angle of the first thoracic segment, but to the posterior margin of that segment. The second pair of antennæ, with a flagellum of nineteen articles, extend to the post-lateral angle of the first thoracic segment.

The segments of the thorax are subequal, with the exception of the first, which is about twice as long as those following. The post-lateral angles of the first segment extend backward. The epimera of the six following segments are not distinct from the segments, but faint lines indicate the place of union. The lateral parts of these segments are drawn out in narrow triangular processes.

The abdomen is composed of two segments, the first of which has three suture lines on either side indicating partly coalesced segments.

The terminal abdominal segment is acutely pointed, with a small lateral tooth on either side, which does not extend to the tip of the large, median terminal tooth. The uropoda are shorter than the terminal segment and do not extend beyond the apex of the lateral teeth. The outer movable branch is capable of folding under the fixed inner branch and is not longer than that branch. Both branches are acutely pointed at the outer post-lateral angles. The inner is obtusely pointed on the inner post-lateral angle; the outer branch is rounded at this point. On the convex portion of the terminal abdominal segment, halfway between the base and the extremity are two small, low tubercles or elevations, one on either side of the median line.



FIG. 15.—CYMODOCE
AFFINIS. ABDOMEN
OF FEMALE.

I place this species in *Cymodoce* with some hesitation, because the specimen, which is a female, has not the mouth parts metamorphosed as is usual with the females in this genus, according to Hansen's recent definition.

This species is very similar to *Spheroma granulata* Edwards from unknown locality, according to Edwards, and from "the east and west coast of Algeria," according to Filhol.

A single female specimen comes from Hakodate Bay, Japan.

Depth.—9 fathoms, in gravel.

Type.—Cat. No. 9346, U.S.N.M.

Genus ZUZARA Leach.

Last thoracic segment in the male with a slender mesial process produced backward. Abdomen composed of two segments. Terminal abdominal segment in female "somewhat produced; in the male strongly produced with a pair of lateral notches, so that the mesial part is shaped as a process narrowed at the base."

Branches of the uropods in the male are large, broad plates.

Maxillipeds with the second, third, and fourth articles of the palp produced into lobes.

Exopod of third pleopod two-jointed. Pleopods of the fourth and fifth pairs have the endopods thick, fleshy, with transverse folds, the exopods two-jointed.

The type of the genus is *Zuzara semipunctata* Leach.

ZUZARA INTEGRÆ Haswell.

Zuzara integra HASWELL, Proc. Linn. Soc. N. S. Wales, VI, 1881-82, pp. 186-188, pl. III, fig. 6.

Body 14 mm. long; 8 mm. wide, increasing gradually in width toward the posterior extremity.

The head is wider than long, 2 mm.: $5\frac{1}{2}$ mm. The anterior margin is produced in a small median point. The first pair of antennæ have the first article of the peduncle dilated; the second article is half as

long as the first and narrower; the third article is twice as long as the second and is slender; the flagellum is composed of 23 articles and extends to the posterior margin of the first thoracic segment. The second pair of antennae extend to the posterior margin of the third thoracic segment; the flagellum is composed of 18 articles. The eyes are large and composite and are post-laterally situated.

The first segment of the thorax is nearly twice as long as the following segments which are subequal. The epimera are produced laterally in processes which have rounded extremities. They are not separated from the segments. The seventh thoracic segment is produced backward in a long median process, with truncate extremity, which extends beyond the first abdominal segment and some distance over the terminal abdominal segment. In the female this process is much shorter, being more in the form of a triangular tubercle.

The first segment of the abdomen is short and has three suture lines on either side indicating partly coalesced segments. The terminal abdominal segment in the male has the sides converging toward the posterior extremity, which has a shallow quadrangular excavation, with a long median process extending some distance beyond the post-lateral angles of the segment. The fixed, inner branches of the uropoda are very large and broad, and surround the posterior part of the abdomen, meeting the produced median process on either side. The outer branches are long and broad, leaf shaped, and extend some distance beyond the inner branches. In the female, the terminal abdominal segment is triangular, with the apex produced in a very acute point. The branches of the uropoda are similar in shape to those of the male, but are not as long or as broad, and the inner branches do not extend to the median point of the terminal segment. The outer branches are but little longer than the inner branches.



FIG. 17.—ZUZARA INTEGRÆ. ABDOMEN AND LAST TWO THORACIC SEGMENTS OF FEMALE. $\times 2\frac{1}{2}$.



FIG. 16.—ZUZARA INTEGRÆ. ABDOMEN OF MALE. $\times 2\frac{1}{2}$.

The legs are all similar and ambulatory.

A large number of individuals of both sexes was collected in rock pools, Halletts cove, St. Vincent Gulf, Australia, by Edgar J. Bradley. The specimens are in the U. S. National Museum, Cat. No. 32247.

Genus ISOCLADUS Miers.

Last thoracic segment in the male with a slender median process produced backward. Abdomen composed of two segments. Terminal abdominal segment similar in both sexes, without notch.

Branches of the uropoda in the male are large, broad plates.

Maxillipeds with the second, third, and fourth articles of the palp produced into lobes.

Exopod of third pleopod two-jointed.

Pleopods of the fourth and fifth pairs have the endopods thick, fleshy, with transverse folds, the exopods two-jointed.

The type is *Isocladus armatus* (Milne Edwards).^a

ISOCLADUS MAGELLANENSIS, new species.

Body less than twice as long as wide, 4 mm.:7 mm. Head wider than long, with the front marginate and produced in a small median point. The eyes are small, composite, and situated in the post-lateral angles of the head. The first pair of antennæ have the first article a little longer than wide; the second article is somewhat shorter than the first—about half as long; the third is one and a half times longer than the second, and narrower. The flagellum is composed of 11 articles and extends to the middle of the second thoracic segment. The second pair of antennæ, with a flagellum of 13 articles, extend to the posterior margin of the third thoracic segment.

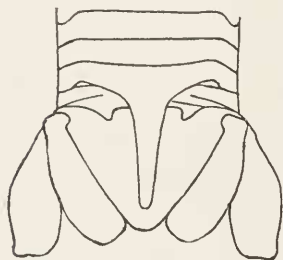


FIG. 18.—*ISOCLADUS MAGELLANENSIS*.
ABDOMEN AND LAST THREE THORACIC SEGMENTS OF MALE. $\times 9\frac{1}{2}$.

The first segment of the thorax is longer than any of the six following segments. The seventh segment is produced in the middle in a long, backwardly directed process, which extends almost to the tip of the terminal abdominal segment. The epimera are not distinct from the segments, but are produced post-laterally in narrow processes.

The abdomen is composed of two segments, the first of which has suture lines at the sides, indicating other coalesced segments. The terminal segment is triangulate, with the apex rounded. The branches of the uropoda are alike in size and shape and are subequal in length. Each is nearly three times as long as broad, with the extremity roundly truncate. All the legs are ambulatory.

This species is close to *Isocladus spiniger* (Dana), but differs in the much wider exopod of the uropoda, which is not acuminate and curved outward at the tip, in the more rounded apex of the endopod of the uropoda and in the longer process of the first abdominal segment.

Only one specimen, a female, comes from Mayne Harbor, Owen Island, Straits of Magellan.

The type is in the Museum of Comparative Zoology at Harvard University. Cat. No. 6960, M. C. Z.

Genus **DYNAMENELLA** Hansen.

Sixth and seventh thoracic segments without processes. Abdomen composed of two segments, the first of which is not produced back-

^a *Sphaeroma armata* Milne Edwards.

ward in any process. Terminal abdominal segment usually with a notch, which may or may not be connected anteriorly with a transverse foramen. Sexes alike.^a

Uropods always with exopod at least half as long as endopod.

Exopod of third pleopod unjointed.

Fourth and fifth pleopoda have both branches subsimilar, with deep, transverse folds, fleshy, and without marginal setæ. Exopod of fifth pleopod generally distinctly two-jointed.

Hansen makes *Dynamene perforata* Moore the type of this genus.

DYNAMENELLA AUSTRALIS, new species.

Body 4 mm. wide: $7\frac{1}{2}$ mm. long. Head quadrangular, frontal margin produced in a small median point. The first pair of antennæ extend to the post-lateral angle of the first thoracic segment: the flagellum is composed of ten articles. The second pair of antennæ reach the posterior angle of the fourth thoracic segment; the flagellum is composed of sixteen articles.

The segments of the thorax are similar in shape and size. The epimera are not distinct from the segments. The lateral edges of the segments are almost straight. Two rows of tubercles extend along the posterior margin of the seventh segment, the two middle tubercles of the last row being very broad; the other segments are entirely smooth.

The two segments of the abdomen are thickly granulated. Eight tubercles are placed in a transverse line on the first segment. On the terminal segment there are three rows of four tubercles in each row in transverse series. In some of the specimens the two middle tubercles of the last row are wanting. The abdomen narrows rapidly toward its extremity, which is deeply excavate, the excavation being wider anteriorly than posteriorly. A small tubercle is placed just above the excavation. The uropods extend but a little beyond the extremity of the abdomen. The inner branch is narrow, long, and rounded posteriorly. The outer branch is leaf-shaped, broad, pointed at its extremity, and somewhat longer than the inner branch.

Both branches of the fourth pleopods are similar, fleshy, crossed with transverse folds, and the exopod is unjointed. The exopod of the third pleopod is also unjointed.



FIG. 19.—DYNAMENELLA AUSTRALIS. ABDOMEN AND LAST THORACIC SEGMENT. $\times 6\frac{1}{2}$.

^a Although the forms which I believed to be the females of *Dynamenella perforata* may prove to be young males, those supposed by Doctor Hansen to be the females of this species can not be so considered, inasmuch as adult males are found exactly similar to them. The females of *Dynamenella perforata* probably resemble the males, as do the females of all the species which I have referred to Doctor Hansen's genus.

The body of the specimen is marked with patches of black over a light surface. The abdomen is dark, as well as the head, and there is a broad stripe of the darker color on the inner uropod.

The two sexes are similar in every respect.

This species differs from *Sphaeroma scabricula* Heller^a in the absence of granules on the segments of the thorax, the absence also of the two carinated ridges on the terminal segment of the abdomen, and the difference in the shape of the uropoda, the inner branch in *Sphaeroma scabricula* being broad and obtuse at the apex, and the outer branch narrow, lanceolate, and longer, while in the present species the inner one is long and narrow, the outer one being broad, but pointed posteriorly.

This species also differs from *Cymodoce cordiforaminalis* Chilton,^b from New Zealand, in the difference in the arrangement of the tubercles of the abdomen, in the narrower inner branch of the uropoda, and in the absence of the spine in the foramen.

A number of specimens, some imperfect, both males and females, are from Cape Town, Africa.

The types are in the U. S. National Museum, Cat. No. 32248.

Genus DYNAMENISCUS Richardson.^c

Seventh segment of thorax not produced backward in any processes.

Abdomen composed of two segments, the first of which has indications of partly coalesced segments and is not produced backward in any process. Terminal abdominal segment with a median notch, which has no median lobe or tooth.

Both branches of the fourth pleopoda are similar, with transverse folds, fleshy, and without plumose marginal setae.

Exopod of the fourth pleopod unjointed.

Exopod of the third pleopod unjointed.

Endopod of second pleopod without stylet in male. Branches of uropods strongly unlike; inner branch short, rudimentary; outer branch, long and curved.

The type of the genus is *Cilicera carinata* Richardson.

DYNAMENISCUS CARINATUS Richardson.

Cilicera carinata RICHARDSON, Am. Naturalist, XXXIV, 1900, p. 224; Proc. U. S. Nat. Mus., XXIII, 1901, pp. 535-536, figs. 17-19; Bull. U. S. Nat. Mus., No. 54, 1905, pp. 319-320, figs. 350-352.

Dynameniscus carinatus RICHARDSON, Bull. U. S. Nat. Mus., No. 54, 1905, pp. x, xi.

^aReise der Osterr-Fregatte Novara um die Erde, Zool., Part 2, 1865, 3 Abth., p. 141, pl. xii, fig. ii.

^bTrans. New Zealand Institute, XV, 1882-83, pp. 188-190.

^cBull. U. S. Nat. Mus., No. 54, 1905, pp. x, xi.

Locality.—Coast of Georgia.

Depth.—440 fathoms.

Collection of the U. S. National Museum.

The head has a median projection on the anterior margin, produced forward in the form of a large tubercle. The eyes are colorless. The first pair of antennæ reach the posterior margin of the head; the flagellum is composed of eight articles. The second pair of antennæ

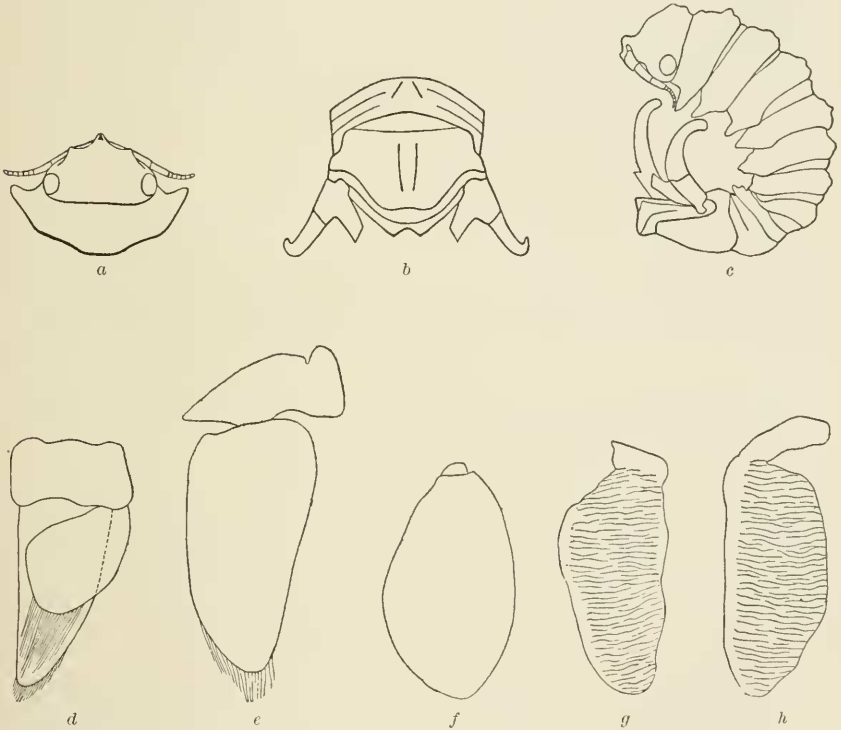


FIG. 20.—*DYNAMENISCUS CARINATUS*. *a*, HEAD. *b*, ABDOMEN. *c*, LATERAL VIEW. *d*, SECOND PLEOPOD (RIGHT SIDE). $\times 27$. *e*, THIRD PLEOPOD OF RIGHT SIDE. (ONE BRANCH.) $\times 52$. *f*, THIRD PLEOPOD OF RIGHT SIDE. (OTHER BRANCH.) $\times 52$. *g*, FOURTH PLEOPOD OF RIGHT SIDE. INNER BRANCH. $\times 39$. *h*, FOURTH PLEOPOD OF RIGHT SIDE. OUTER BRANCH. $\times 39$.

reaches the posterior margin of the first thoracic segment. The segments of the thorax are roughly granulated. A transverse median ridge or elevation appears on each one of the segments, giving the dorsum, from a lateral view, a very rugged appearance. The epimera are rough and are drawn out laterally in very acute angles.

The abdomen is composed of two segments, the first segment being formed of several coalesced segments, as indicated by two suture lines. In the center of this segment are two longitudinal ridges, placed obliquely, so as almost to meet anteriorly and to diverge at the

other extremity. This segment projects down over the last segment at either side. The last segment has a deep excavation at its posterior extremity, around and above which is a carinated ridge extending entirely around the whole of the posterior half of the segment. Two small longitudinal ridges are in the center of the segment. The inner branch of the uropoda is very short, not reaching the extremity of the abdomen by some distance; it is quadrangular in shape, with sides nearly parallel, and obliquely truncated at the end. The outer branch of the uropoda is long, curved, and pointed at the end, resembling a hook somewhat.

The color is a light yellow. In appearance the little isopod is very rough and rugged looking.

The only specimen is a male.

Genus *DISCERCEIS* Richardson.^a

Thorax composed of seven segments, the seventh segment not being produced backward in any processes. Abdomen composed of two segments, the first of which has indications of partly coalesced segments, and is not produced backward in any processes. Terminal abdominal segment with a median notch, which bears a tooth or lobe in the center.

Both branches of the fourth pleopoda are similar, with transverse folds, fleshy, and without plumose, marginal setae.

Exopod of the fourth pleopod unjointed.

Exopod of the third pleopod jointed, and composed of two segments.

Branches of uropoda unlike, strongly dissimilar; inner branch short, rudimentary; outer branch long and somewhat curved.

The type of the genus is *Cilicxa granulosa* Richardson.

DISCERCEIS GRANULOSA Richardson.

Cilicxa granulosa RICHARDSON, Proc. U. S. Nat. Mus., XXI, 1899, p. 841, fig. 18; Ann. Mag. Nat. Hist. (7), IV, 1899, pp. 186-187; Bull. U. S. Nat. Mus.; No. 54, 1905, pp. 309-310, fig. 335.

Discerceis granulosa RICHARDSON, Bull. U. S. Nat. Mus., No. 54, 1905, p. x.

Locality.—Cerro Island, Lower California.

Depth.—20 fathoms.

Collection of the U. S. National Museum.

The surface of the body is densely granulated; the granules are large and close together. Width, $4\frac{1}{2}$ mm.; length, 9 mm.

The head has the anterior margin thickened and produced in a small median point, on either side of which the margin is lobate. The eyes are situated post-laterally. The first pair of antennae extend to the posterior margin of the first thoracic segment; the first article of the peduncle is oblong; the second article is short. The second pair of antennae extend to the posterior margin of the third thoracic segment.

^a Bull. U. S. Nat. Mus., 1905, No. 54, p. x.

The first thoracic segment is longer than any of the following segments. The epimera are twice as broad as long.

The first abdominal segment is short and has indications of three coalesced segments. There are three transverse elevations on this segment which are densely covered with granules. The terminal segment has three transverse elevations at the base, the median one terminating in a spine. On its posterior margin is a quadrangular excavation with a long median tooth, bearing a spine at its extremity. At the base of the tooth is a small elevation. On either side of the terminal excavation, a short distance up the lateral margin, is a small spine. The fixed inner branch of the uropoda is small and short, the outer branch is long, blunt at the extremity, somewhat incurved, and reaches, when open, much beyond the terminal segment.

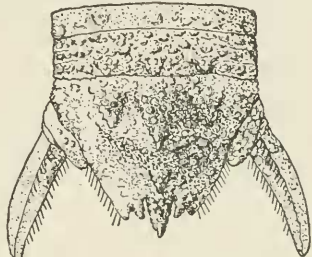


FIG. 21.—DISCERCEIS GRANULOSA.
LAST THORACIC SEGMENT AND ABDOMEN. $\times 8$.

The margins of the terminal segment and the edges of the outer branch of the uropoda are pubescent.

The legs are all simple, ambulatory.

There are but two specimens of this species, both of which are males.

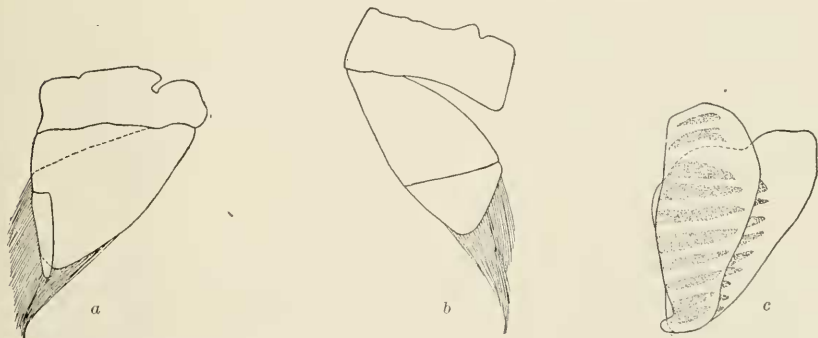


FIG. 22.—DISCERCEIS LINGUICAUDA. a, SECOND PLEPOD OF RIGHT SIDE. 52. b, THIRD PLEPOD (EXOPOD). $\times 52$. c, FOURTH PLEPOD. $\times 51$.

DISCERCEIS LINGUICAUDA Richardson.

Cilicxa linguicauda RICHARDSON, Proc. U. S. Nat. Mus., XXIII, 1901, pp. 536-537, fig. 20; Bull. U. S. Nat. Mus., No. 54, 1905, p. 309, fig. 334.

Discerceis linguicauda RICHARDSON, Bull. U. S. Nat. Mus., No. 54, 1905, p. x.

Locality.—Cape Catoche, Yucatan.

Depth.—24-25 fathoms.

Collection of the U. S. National Museum.

Body $3\frac{1}{2}$ mm. long; 7 mm. wide.

Head subtriangular in shape; frontal margin with a small median point; eyes post-laterally situated. The first pair of antennæ reach the posterior margin of the first thoracic segment; the second pair touch the fourth segment.



FIG. 23.—DISCERCEIS LINGUICAUDA. ABDOMEN.

The first segment of the thorax is a little longer than any of the others, which are similar in size. The epimera are not distinct from the segments, and are produced into acute points, with the exception of the last segment, which has the epimera quite rounded.

The abdomen is composed of two segments, the first of which gives indication of three coalesced segments, and has a small tooth on each side on its post-lateral margin. The last segment is swollen anteriorly, and bears three low tubercles on this portion. The extremity of the abdomen is marked by a sinus, which is almost completely filled by a single large tooth, which is posteriorly triangular and extends beyond the lateral teeth formed by the sinus. This central tooth bears a small, pointed tubercle near its base. The branches of the uropoda are strongly unlike; the inner branch is short, rudimentary; the outer branch is slightly incurved and is somewhat longer than the abdomen.



FIG. 25.—DISCERCEIS LINGUICAUDA. FOURTH PLEPOD. $\times 52$.

The color is a dull yellow. The lower part of each thoracic segment is densely granulated as well as the whole surface of the abdomen. The edges of the segments and the uropoda are fringed with hairs.

The only specimen is a male.

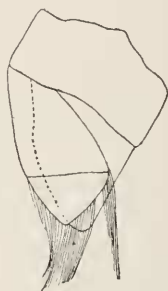


FIG. 24.—DISCERCEIS LINGUICAUDA. THIRD PLEPOD. $\times 52$.

Genus CASSIDIAS, new genus.

Mouth parts of female metamorphosed. Seventh segment of thorax not produced backward in any process.

Abdomen composed of two segments, the first of which is not produced backward in a median process. Terminal abdominal segment, with a narrow notch, which is sometimes concealed dorsally, but a groove is formed beneath by the infolding of the margins.

Both branches of the fourth pair of pleopods are similar, fleshy, with transverse folds and without marginal setæ. The exopod of the the third pleopod is two-jointed.

The branches of the uropods are similar, the outer one being capable of folding under the inner one.

This genus is nearest to *Cassidinopsis* Hansen than to any other genus, but differs in having the mouth parts metamorphosed in the female and in having the head of normal size.

The type of the genus is *Cassidias argentina*, the description of which follows.

CASSIDIAS ARGENTINEA, new species.

Body oval, contractile into a ball. Head wider than long, with the front marginate and produced in a small median point. The eyes are small, composite, and placed in the post-lateral angles. The first pair of antennae have the first article oblong, about one and a half times longer than wide; the second article is minute, round; the third article is narrow, elongate, and about twice as long as the second. The flagellum is composed of nine articles and extends to the middle of the

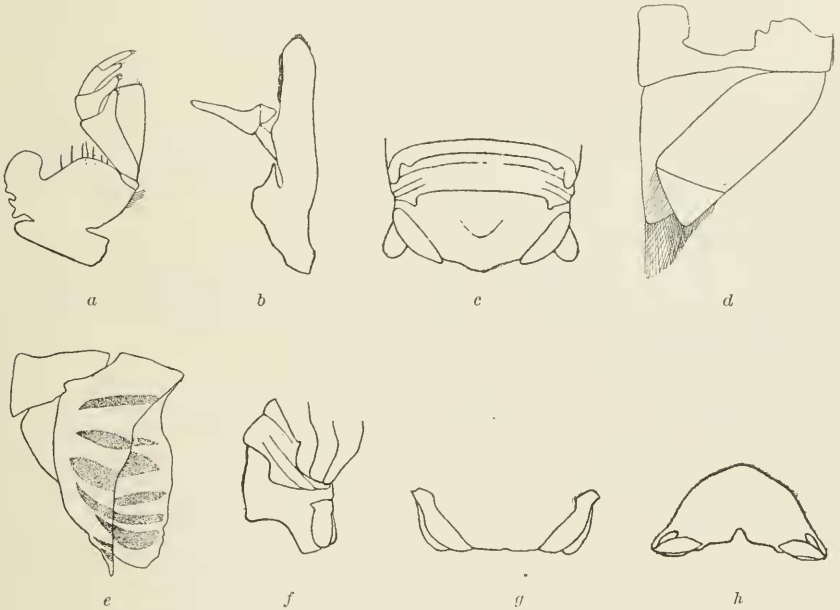


FIG. 26.—CASSIDIAS ARGENTINEA. *a*, MAXILLIPED OF FEMALE. $\times 52$. *b*, FIRST MAXILLA OF FEMALE. $\times 52$. *c*, ABDOMEN AND LAST THORACIC SEGMENT OF FEMALE. $\times 4\frac{1}{2}$. *d*, THIRD PLEOPOD. $\times 39$. *e*, FOURTH PLEOPOD. $\times 39$. *f*, LATERAL VIEW OF ABDOMEN. *g*, ABDOMEN. *h*, TERMINAL VIEW OF ABDOMEN.

first thoracic segment. The second antennae, with a flagellum of ten articles, extend to the posterior angle of the first thoracic segment.

The first segment of the thorax is a little longer than any of those following. Epimera are not distinct on any of the segments, but they are indicated by faint lines of depression. The lateral parts of the segments are drawn out in narrow processes.

The abdomen is composed of two segments, the first of which has three suture lines on either side, indicating coalesced segments. The terminal segment is produced in a truncate extremity, which has a small rounded excavation in the center. The notch is entirely concealed in a dorsal view, and is formed by the infolding of the sides.

At the base of the segment is a large prominent median elevation or tubercle. The inner immovable branch of the uropoda is long and narrow, leaf-shaped, and pointed at the extremity. The outer branch is a little shorter than the inner branch and has the posterior extremity rounded. The endopod and exopod of the fourth pleopod are similar, rather fleshy, with transverse folds, and without marginal setæ. The

exopod of the third pleopod is two-jointed.

All the legs are ambulatory in structure.

This genus, to which *Cymodoce darwini* Cunningham^a should be referred, comprises as yet but two species. The present one differs from *Cassidias darwini* in the much

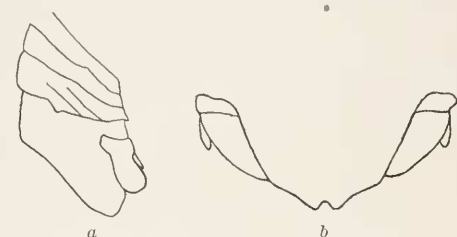


FIG. 27.—*CASSIDIAS DARWINI*. *a*, LATERAL VIEW OF ABDOMEN. *b*, ABDOMEN.

longer exopod of the uropoda, in the much larger median tubercle on the terminal abdominal segment, and in the more shallow notch at the extremity of this segment.

Two specimens, both females, come from off Rio de la Plata, Argentine Republic. They were collected by the U. S. Bureau of Fisheries steamer *Albatross* in 1887, at a depth of 10½–11½ fathoms, among sand and broken shells.

The type is in the U. S. National Museum, Cat. No. 32249.

^aTrans. Linn. Soc. London, XXVII, 1871, pl. LIX, figs. 1a, b; Studer, Abhandlungen d. Königlichen Akademie d. Wissenschaften zu Berlin, 1883, pp. 18–19, figs. 6a, b; Dollfus, Mission Scientifique du Cap Horn, 1891, pp. 65–66, pl. VIII, figs. 8a, b.